



# U.S.NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

*Protecting People and the Environment*

## **After Fukushima: *Where Do We Go from Here?***

**Center for Strategic and International  
Studies**

*William D. Magwood, IV  
Commissioner  
March 22, 2012*

# Nuclear Regulatory Commission

## Who We Are

- The Energy Reorganization Act of 1974 divided the Atomic Energy Commission into a “promotional” technology development agency – the Department of Energy – and a regulatory agency – the NRC.
- NRC is 4000 people dedicated to assuring the safe and secure use of nuclear materials in the United States in order to protect and safety of the American people.





# NRC in 2011

## *Prepared for the Unexpected*



**Clockwise: Flooding at Ft. Calhoun; NRC EOC Staff Tracking Hurricane Irene; National News Coverage of East Coast Quake**







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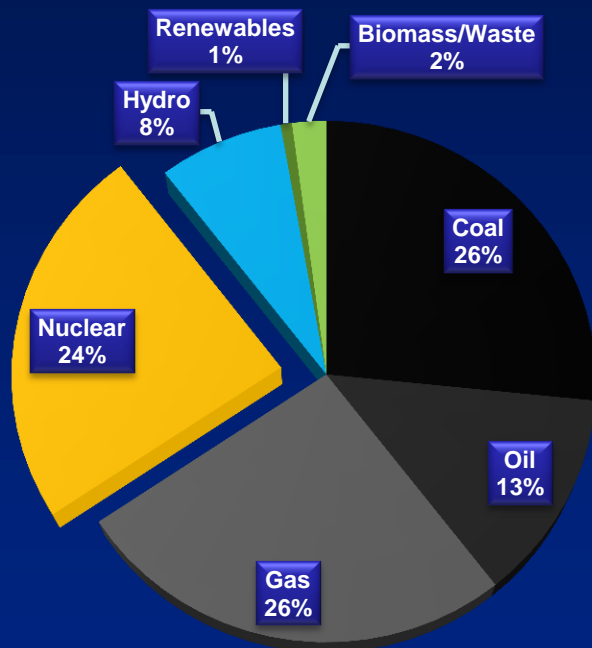
# Fukushima Daiichi

*March 11, 2011 and Beyond*



# The Energy Picture in Japan *Before Fukushima*

## *Electricity Production in Japan (2008)*



- Japan imports about 80% of its energy – mostly oil and LNG from the Middle East
- Japan has 54 power reactors, the third largest nuclear energy commitment in the world (estimated contribution = 30% of Japanese production in 2010)
- Japan established a long-term plan to expand nuclear capacity to provide 40% of electricity production by 2017.

# **Fukushima Daiichi** *Before the Tsunami*

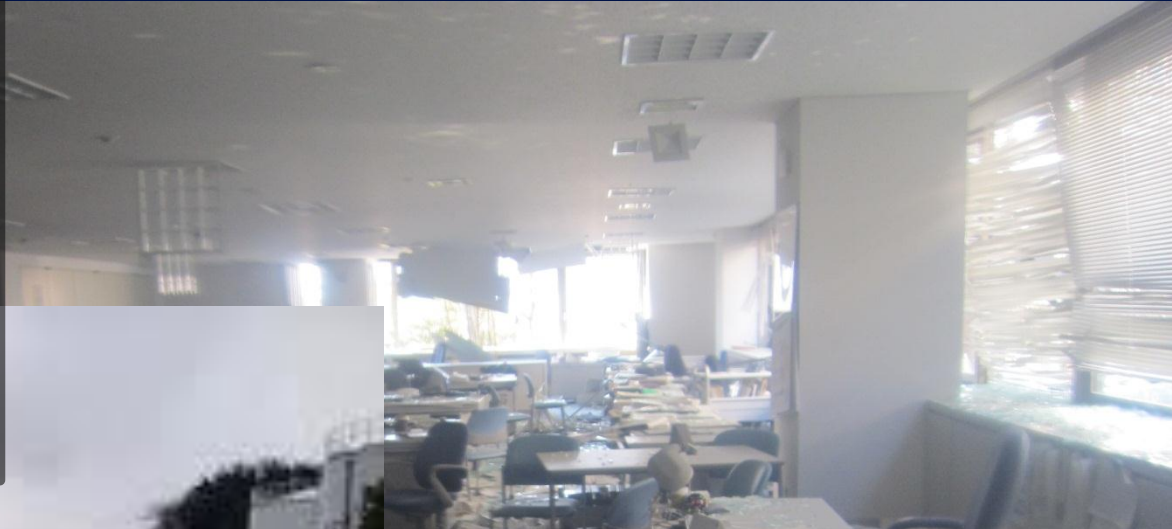


- **4696 MWe Nuclear Power Plant operated by Tokyo Electric Power Company**
- **Six Boiling Water Reactors (BWRs) based on US designs— brought on-line between 1971 and 1979**
- **Most of the plant's output was used to provide electricity to Tokyo**
- **TEPCO had planned to construct two advanced BWRs at the site beginning in 2012**



# **Fukushima Daiichi on March 11**

## ***A Bad Day At the Plant***



- **Magnitude 9.0 earthquake followed by 15 meter tsunami at the plant**
- **Extended Station Blackout**
- **Batteries depleted and subsequent loss of all reactor cooling**
- **Core damage in units 1, 2, and 3**
- **Hydrogen explosions in reactor buildings housing units 1, 3, and 4**

# **Fukushima Daiichi**

## ***NRC's Immediate Response***

- **Activated EOC - staffed 24/7 9 weeks**
- **Dispatched expert advisors to Tokyo**
- **Coordinated Environmental Monitoring with DOE & EPA**
- **Conducted series of special inspections at U.S. nuclear power plants**
- **Launched Near-Term Task Force to analyze Fukushima event and assess NRC regulatory approach**



# U.S. Government Response

## *Multi-Agency Assistance*

### HHS

- Provided expert advice regarding the use of potassium iodide or the need to switch to bottled water for Americans in Japan

### DOE /NNSA

- Provided specialized robotic equipment to Japan
- Conducted various nuclear analyses
- Provided aerial measurement systems
- Conducted thousands of air and field samples in Japan
- Analyzed samples at U.S. national labs

### NRC

- Provided modeling and analytical support to U.S. and Japanese organizations.
- Deployed expert team to Japan with experience including:
  - BWR reactor safety systems
  - Dose assessment
  - Protective measures

### DoD

- Provided \$88.6 million in humanitarian assistance
- Conducted USAR operations and transport of USAR cargo
- Delivered tons of water, food and medical supplies to affected areas, as well as personnel.
- Assured safety of U.S. military personnel based in Japan.

### FEMA

- Deployed search and rescue teams to Japan to conduct missions utilizing canines and listening devices

### AID

- Coordinated overall USG relief efforts.
- Deployed a Disaster Assistance Response Team to support emergency response.
- Provided \$6.3 million in humanitarian assistance, including urban search and rescue (USAR) activities.

### U.S. Embassy Japan

Focal point for relief efforts and information point for American citizens in Japan

# **After Fukushima** *Learn the Big Lessons*

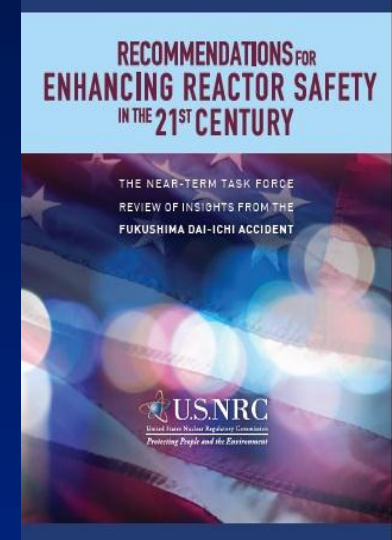
- **Understand the Risks Facing Each Plant**
- **We Can't Predict Every Event**
- **Recovering from Disaster is At Least as Important as Preparing for Disaster**
- **Potential for Common Cause Failure of On-Site and Off-Site AC Power**



# **NRC Near-Term Task Force**

## ***U.S. Plants Are Safe***

- **No imminent risk from continued nuclear power plant operation and licensing activities.**
- **Similar events in the U.S. very unlikely.**
- **Mitigation measures already in place could reduce the likelihood of core damage and radiological releases.**
- **12 Technical recommendations to further enhance U.S. nuclear safety.**





## **Enhancements to Nuclear Safety** *Elements of Prioritized NRC Action*

- Reevaluation of All External Hazards for Each Plant
- Enhanced Station Black Out Rulemaking
- Mitigating Strategies for Beyond Design Basis Events
- Installation of Reliable Hardened Vents for BWR Mark I and Mark II Containments
- New Spent Fuel Instrumentation Requirements
- Integration of Emergency Procedures
- Staffing and Communications for Multiunit Events

# What's Next?

## *Work Continues at Fukushima*



# What's Next?

## *Impacts on Japanese Nuclear Power*

### Current Status of the Nuclear Power Plants in Japan (as of Feb. 20, 2012)

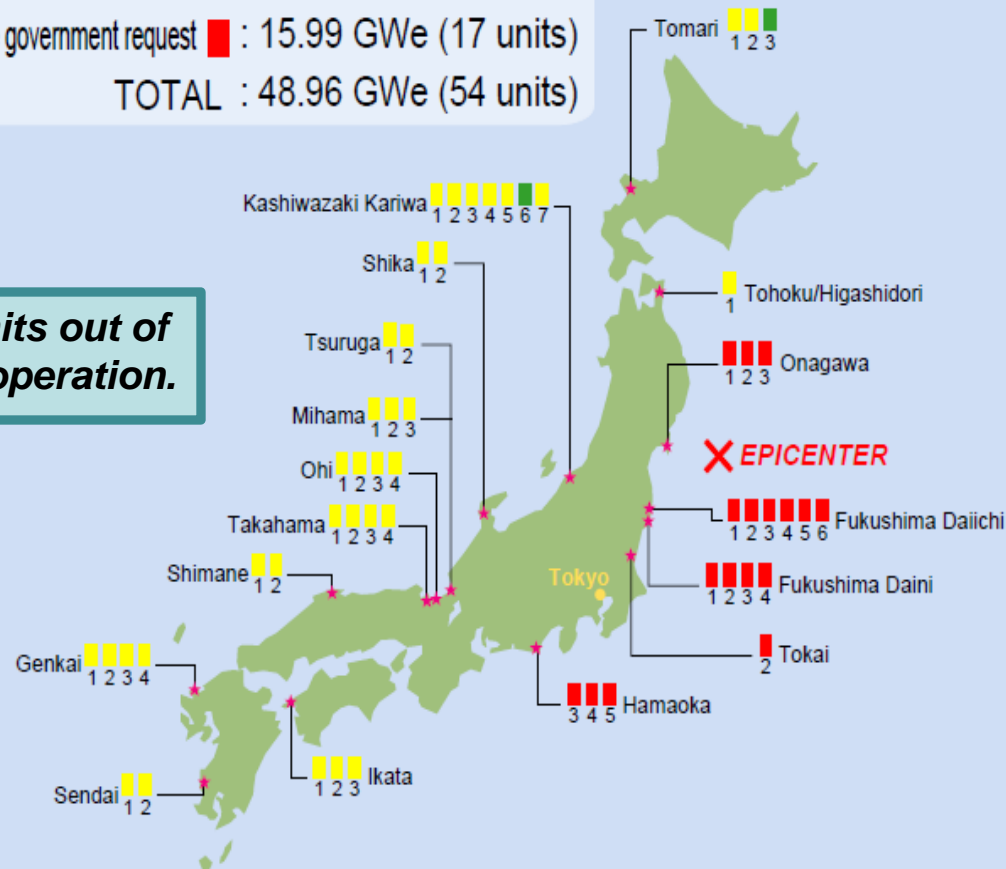
In operation ■ : 2.27 GWe (2 units)

Outage for the periodic inspection and others ■ : 30.70 GWe (35 units)

Shutdown due to tsunami and the government request ■ : 15.99 GWe (17 units)

**TOTAL : 48.96 GWe (54 units)**

**Only 2 units out of 54 are in operation.**





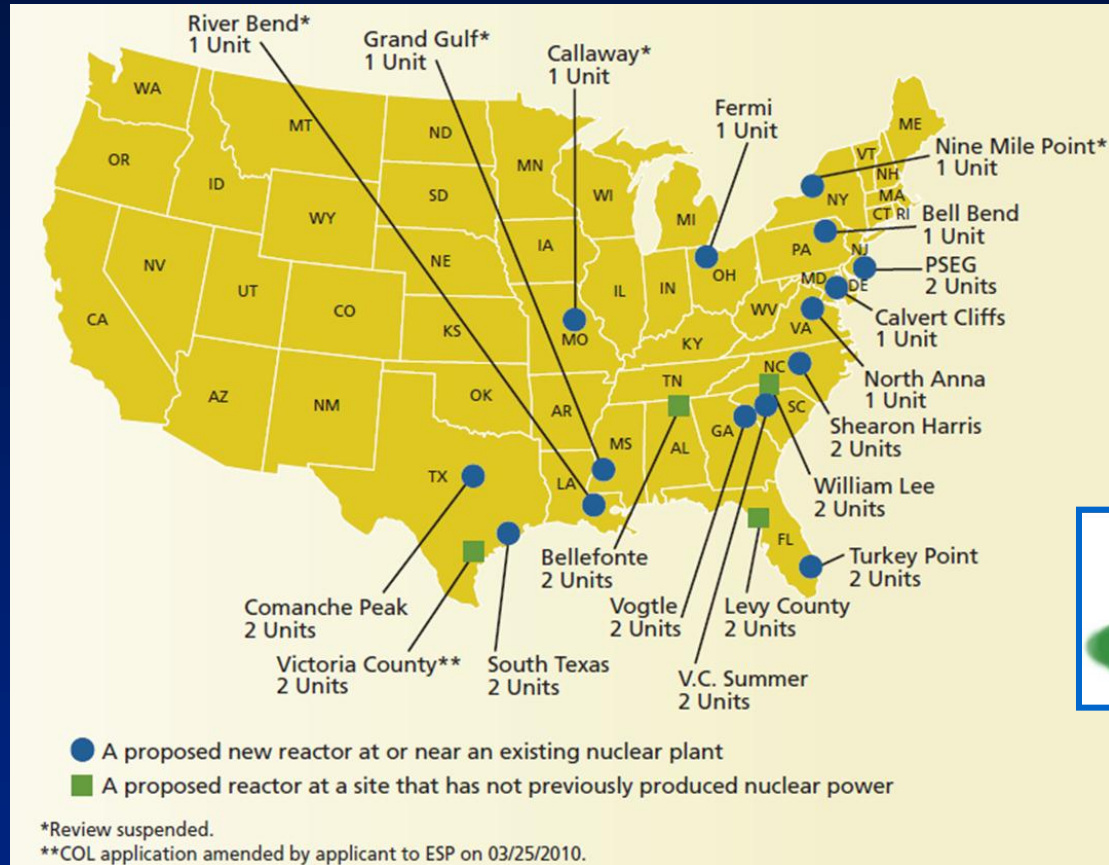
## **What's Next?**

### *In the US – Major Policy Questions*

- **Should We Further Revise our Approach to Emergency Planning?**
- **Do We Need a New Regulatory Regime to Address Beyond Design Bases Events?**
- **Do We Need to Revise Our Regulatory Approach to Look Beyond Safety and Address Large Socio-economic Disruptions?**

# What's Next?

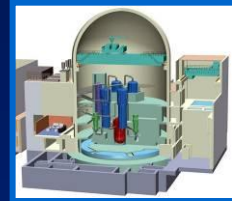
## Still On Track to Evaluate New Plants



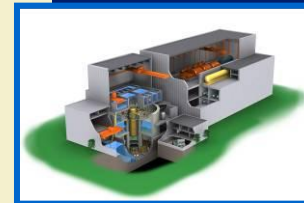
**ABWR**



**AP1000**



**US APWR**



**ESBWR**



**US EPR**

**The NRC continues to review Generation III+ designs and 10 license applications to build new advanced LWR power plants in the U.S.**

# U.S. Nuclear Power Plant Projects

## *The Work Continues*



Georgia Power is beginning full scale construction after receipt of a combined Construction and Operating License from the NRC



# U.S. Nuclear Power Plant Projects

## *The Work Continues*

SCANA has built a large Module Assembly Building and other construction-support facilities at the V.C. Summer site near Jenkinsville, SC as it prepares to build two AP1000s.



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